

**Notes August 9, 2007**  
**Nutrient Science Advisors Group**  
**257 Science Hall**

Participants: Tom Wilton, Joe Larscheid, Mike Quist, John Olson, Ed Brown, Chris Jones, John Downing, John Reyna, Jeff Robichaud, Mike Burkart, and Bill Ehm.

Observers: Connie Dou (DNR), Adam Schnieders (DNR), Anita Maher Lewis (Ami Consulting), and Chris Gruenhagen (Farm Bureau).

The meeting started at 10:15 AM

**Presentation of CH-a, Secchi depth, and TP probability analysis**

Joe Larscheid presented results of an analysis of 6-years of TP, Chl-a, and Secchi depth measurements in Iowa lakes. He analyzed the probability that a range of potential criterion would be met using: June samples (period 1), July samples (period 2), August samples (period 3), and all samples.

Observations discussed included:

Confidence intervals on most probability values were tight giving confidence that the samples were appropriate to make solid interpretations.

Substantial inter-annual variability exists among all variables.

Period 2 and all samples were approximately similar. It was suggested that a minimum sample that captures the average could be taken in June. However, the ecological concern should be on the extreme conditions. In many of our lakes, even the “good” ones, harmful blooms may occur in August.

The probability of meeting a Secchi criterion changes most at about 1.0 m providing another line of evidence supporting the consensus that this is an appropriate criterion.

Several ideas were suggested for how we can use these analysis to establish frequency and duration recommendations. The one that got most support was the question: How frequently could you accept a specific (secchi depth or chl-a) value to sustain a healthy ecosystem. The curves show that to be about 0.8 (80%) for Secchi depth.

Probability of meeting TP criteria up to 60 µg/L seldom exceeded .4 (40%). The explanation offered by several is that Iowa’s lakes are overloaded with P.

August would be that sampling time to define variable values that are indicators of a good ecosystem.

**Joe Larscheid** agreed to develop a probability distribution of these variables in Iowa’s “good” lakes. These are lakes that he and John Downing classified using a great variety of variables from the lake-studies data. The number of these lakes is either 10 or 22, depending on which of their categories are used. We want to consider using these results to support a frequency/duration recommendation associated with Secchi and Chl-a. The intent is to set the frequency of a criterion to avoid the worst conditions in the best lakes. It was noted that this sounds somewhat like the “reference” system proposed by EPA, but rejected by DNR as impossible in view of the lack of “reference” or “pristine” lakes in the State.

Joe will provide the text, graphs, and tables supporting our decision when we get to the specific criteria discussions.

It is possible that some lakes would not meet one or more criterion during only part of the year.

Joe Larsheid mentioned that in a conversation with Steve Heiskary, he said he would be willing to come down to meet with us. Steve is one of the foremost experts on a number of topics that specifically relate nutrient dynamics and water-quality criteria. Mike Burkart suggest we invite him down in November if Joe will make the invitation.

### **Presentation of analysis of IowaLakes survey and EPA water-quality ladder**

John Downing explained that using all the survey responses provided no more information than using the average response value for each lake when correlated with Secchi depth. We concluded that we will use the median ladder value for each lake as evidence to support a 1.0 m Secchi depth criterion.

It turns out that a Chl-a value of about 27 µg/L correlates with the median ladder value of 6, the minimum value for swimmable lakes.

It was decided to continue using metric units. A parenthetical conversion to English units will be provided in an executive summary of the recommendations.

It was pointed out that an analysis of only those lakes with a median average ladder value of 6 could be used to define “good” lakes for purposes of supporting a criterion for Chl-a.

**John Downing** will produce a histogram of Chl-a values after selecting all lakes with a median ranking of 6 or larger. Initial examination of the plotted data shows a value of 25-30 µg/L that would be needed to correlate with the swimmable lakes perception.

**Tom Wilton** will conduct a quantile analysis of these same data to get a maximum value for Chl-a (and minimum value of Secchi depth) or envelope boundary for what are perceived to be swimmable lakes in the survey. This value appears to be 40 µg/L, just looking at a plot of the data.

We agreed that we should use Joe’s “good” lake analysis to add evidence justifying our decisions on Secchi and Chl-a criteria.

A question was raised about how the numbers we were discussion for criteria compared to those in the R7 TAC report. **John Olson** agreed to distribute an electronic copy of the interim report unless it is labeled “do not distribute.” His opinion was that the recommended values were so low as to not be useable in Iowa.

### **Specific Secchi depth criterion discussion**

After substantial discussion on specific language it was agreed to use a threshold value of 1.0 m Secchi depth to be met 90% of the time. This was based on analysis of the 10 best lakes. In these lakes, the threshold was not met only 4% of the time. It was pointed out that only 1 sample in three years (3 samples per year) would be sufficient for a lake to fail this criterion. It was suggested that this may be sufficient to increase sampling frequency in that lake to learn more about the reduced transparency and determine if this was a long- or short-term phenomenon.

There was sufficient lack of consensus that we asked Joe to expand his analysis to the 22 good lakes. The result was that these lakes failed to meet the 1.0 m criterion 14% of the time. Using

85%, rather than 90% eliminated the objection of those unwilling to accept 90%. The principal reason for removing their objection was that now a lake could have a Secchi depth measurement less than 1.0 m once every three years (e samples per year) without failing the criterion.

It was pointed out that one could devise a sampling program that would perhaps never produce a Secchi depth less than 1.0 meter, say under the ice. Consequently, we needed to include a qualifier about the timing of sampling for this and other criterion. It was agreed to use a statement related to the sampling timing used in the analysis rather than meddle with an implementation decision that was more related to policy than science.

The following was the consensus statement the group developed:

**The consensus of the NSA is that a secchi depth of less than 1.0 m is not compatible with lakes classified for primary body contact recreational use (Class A).**

**Recognizing natural factors in Iowa's lakes, Secchi depth may occasionally fail to meet 1.0 m, the criterion must be met 85% of the time for purposes of determining attainment of Class A uses (Fig/table \_\_\_\_ Joe's analysis—both August sample and all samples). This frequency was based on three summer (June-August) seasons of data with at least three samples collected per year.**

The discussion about the Chl-a criterion yielded the following consensus statement:

**In lakes classified for primary body contact recreational use (Class A) chlorophyll-a concentration will not exceed (20) µg/L. (22 lakes**

**Recognizing natural factors in Iowa's lakes, Chl-a may occasionally fail to meet 25 µg/L, the criterion must be met 85% of the time for purposes of determining Class A. This frequency was based on three summer (June-August) seasons of data with at least three samples collected per year. (Fig/table \_\_\_\_ Joe's analysis—both August sample and all from 22 good lakes).**

A discussion about additional content and text for lines of evidence supporting the criteria included a series of actions.

**Joe Larscheid** agreed to provide the specific statement about natural breakpoint of Chl-a concentration (22-23 30 µg/L) correlated to Secchi depth (~1.2 m). The reference for this statement will be his graph and table—currently Figure 1 in draft recommendation document.

**John Downing** will continue to search for the reference to Ontario's use of 1.2 m Secchi depth in lake criteria.

**Ed Brown** will examine the Minnesota Lakes Study report for more justifications for setting a Secchi criterion.

**Mike Burkart** will post the MN Lakes Study unless it is already posted on the forum/blog.

**Mike** will also develop an introductory paragraph on Secchi depth and move the preamble discussion of Chl-a to the introduction for consistency.

**John Downing** had agreed to develop graphs to support TP and TN criteria that can be derived from correlations with a Secchi criterion of 1.0 m and a Chl-a criterion of 25 µg/L. He asked that

we develop specific questions so he could draft an appropriate statement defining the value. These are: **What is the TN or TP concentration at which Secchi depth will be at least 1.0 m with a probability of 85%?** Similarly, **What is the TN or TP concentration at which Chl-a not exceed 25 µg/L with a probability of 85%?**

**Mike Burkart** will send his notes on this meeting for comment before Bill Ehm posts them as minutes of the meeting.

**Mike Burkart** will distribute a draft version 6 by e-mail and web posting by September 1 that will include the graphs and language to be produced as action items above.

### **Schedule and aquatic life discussion**

**Mike Burkart** reported on a meeting with Rich Leopold where he proposed the NSA group would likely be able to recommend criteria for Class A Lakes by about November. He also stated that aquatic life or Class B (LW) recommendations will require substantial analysis and data acquisition that could take more than a year. He suggested that additional funding would be needed to meet even that timeline because all the group's efforts to date had essentially been volunteered.

Because the aquatic life effort could not be accomplished as readily as the Class A recommendations, Mike also proposed developing a study group for the aquatic life discussions that overlapped with the NSA group. This aquatic life study group would attempt to fill in the biological gradient and nutrient concentrations suggested as a tiered aquatic life approach. This was in reference to a discussion led by Gary Welker at the June 26 meeting. The group would continue discussions after the NSA group concluded the Class A recommendations, although all the original group was welcome to continue participating. At least one step of this would be to develop a pre-settlement condition from lake and stream sediment cores that could serve as the "natural" end of the gradient. Some of the people he has met that might have experience and knowledge to contribute to the discussion include Dick Baker, Mike Birmingham, John Downing, Todd Hubbard, Joe Larscheid, Mike Quist, Ed Brown, and Tom Wilton. Tom noted that he would be able to contribute some of his time to this effort.

### **Final considerations**

The question was raised about whether we intended that all the criteria be met to protect a lake for Class A use. It was agreed that we do not want to constrain DNR further by answering this question. That would give DNR the flexibility to deal with one or more failures to meet criteria in the context of other factors affecting implementation of the recommendations.

A question about the 85% probability of meeting a criterion was raised. It was suggested that we carefully consider the implications of this for those in the DNR that would have to implement the criteria. As an alternative, a statement was proposed that allowed failure to meet a criterion in one year (33%), but not two years consecutive years with one failure or 3 out of 5 years. Any alternative would require a clear justification derived from our lake data.

### **Future meetings**

Next meeting September 12, 10:00-4:00, Room 257, Science I, ISU

**Mike Burkart** will solicit responses for a proposed meeting on October 15, 17, 22, or 24. The meeting ended at 3:45 PM